BRUHAT BANGALORE MAHANAGARA PALIKE, BANGALORE

Name of Work: **"Modified Estimate for Dvelopment of water body atJ.P Park in ward No-17"**

Detailed Estimate

Estimated Cost is Rs.351.92Lakhs

Assistant Executive Engineer
BBMP, Bangalore

Executive Engineer
BBMP, Bangalore

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Name of work: Modified Estimate for Devlopment of water body at J.P Park in ward No-17

Sl No	Description of Items	No	Length	Width	Depth	Quantity	Unit	Rate	Amount
1	**Cutting and burning or disposing off Apu /** Jondu from marshy areas as directed with initial lead upto 50 m and all lifts.								
	Total Area of the Tank(23821.00Sq.m)								
	Consider 20% of area					4764.00	Sqm	3.45	16,435.80
2	**Excavation** and removal of silt or silt mixed with sand in **slushy condition** from canal bed including disposing off the same in spoil bank or on the canal embankment in layers as directed etc., complete with intial lead upto 50m and all lifts.								
	As per the Calculation Sheet					19699.00	Cum	123.04	2423764.96
3	**De-silting tank bed/feeder channel in dry condition** by excavating the deposited bed material and loading the same to transport vehicle (excluding cost of transportation) including cost of all machinery, labour etc., complete with lead upto 1 km and all lifts.								
	As per the Calculation Sheet					16691.60			
	Upto 125%					15303.75	Cum	60.94	932610.53
	Above 125%					1387.85	Cum	143.75	199503.44
4	**Dewatering by mechanical** means including hire charges of machinery,fuel and crew charges etc., complete as per the direction of the Engineer- in charge								
	SHP diesel pump					7.00			
	fuel charges					57.00			
	Crew charges					41.40			
						105.40			
	Total 8hr/day=25daysX8hrsX3pumps/days=600								
						600.00	hrs	121.20	72,720.00
5	**Providing new embankment** abutting to existing bund to strength the existing bund using soil available in adjacent area in layers of 200 to 250 mm and compacting each layer to density control of not less than 95 percent by vibrating plate compactor or pnuematic tamper including cost of all materials, machinery, labour, picking previous layer, spreading soil in layer, breaking clods, watering etc., complete with lead upto 50 m and all lifts.								
	For Slope Correction		(b=2+5.75=3.88)						
	East and West Side	2	82.00	3.88	2.50	1588.75			
	Raiway Track Side As per Calcualtion Sheet					1168.25			
	Asper Calculation Sheet					2757.00	Cum	102.34	282151.38
6	**Earthwork excavation for foundation** of buildings, culverts, watersupply, sanitary lines and electrical conduits either in pits or in trenches 1.5m and above in width, in ordinary soil not exceeding 1.5m. in depth including dressing the bottom and sides of pits and trenches, stacking the excavated soil; clear from edges of excavation with lead upto 50 m. after breaking of clods complete as per specifications.								
	For Foundation	1	297.00	4.00	1.50	1782.00	Cum	171.25	305167.50

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Sl No	Description of Items	No	Length	Width	Depth	Quantity	Unit	Rate	Amount
7	Providing and Filling in foundation with **granite/trap broken metal 100 mm** and down size,with approved sand including hand packing, ramming, watering, including cost of all materials and labour with all lead and lift. complete as per specifications								
	For Foundation	1	297.00	4.00	0.40	475.20			
	Upto 125%					104.75	Cum	2005.08	210032.13
7.1	Above 125%					370.45	Cum	2234.91	827922.41
8	Providing and laying in position plain **cement concrete of mix M15** with cement @ 240kgs, with 20mm and down size graded granite metal coarse aggregates @0.878cum and fine aggregtes @ 0.459cum, machine mixed, concrete laid in layers not exceeding 15 cms. thick, well compacted, in foundation,plinth and cills, including cost of all materials, labour, HOM of machinery, curing complete as per specifications.								
	For Foundation	1	297.00	3.60	0.15	160.38			
	Upto 125%					109.25	Cum	5393.61	589251.89
8.1	Above 125%					51.13	Cum	6067.59	310235.88
9	KSRRB M2100-17.2. Plain / Reinforced Cement Concrete **design mix M25** with OPC cement @ 340kgs, with 20mm and down size graded granite metal coarse aggregates @0.70cum and fine aggregates @ 0.47cum, with superplastisiser @3lts confirming to IS9103-1999 Reaffirmed-2008,**Open Foundation** complete as per Drawing and Technical Specification Case - II : With Batching Plant, Transit Mixer and Concrete Pump MORTH Specification No. 1500,1700 & 2100 (Pg 209 & Item no27.31)								
	For Footing	1	297.00	3.40	0.30	302.94			
		1	297.00	0.55	0.30	49.01			
		0.50	297.00	1.10	0.30	49.01			
		0.50	297.00	1.75	0.30	77.96			
						478.91	Cum	6,490.69	3108472.57
10	KSRRB M2200-5.12.Plain / Reinforced Cement Concrete Design **mix M25 with OPC cement @** 340kgs, with 20mm and down size graded granite metal coarse aggregates @0.7cum and fine aggregates @ 0.47cum, with superplastisiser @3lts confirming to IS9103-1999 Reaffirmed-2008 - **i) Upto 5m height** (Pg 213 & Item no 28.7.12)								
	For Wall			b=(0.55+0.3)/2					
		1	297.00	0.43	2.70	340.81			
		1	297.00	0.30	2.80	249.48			
						590.29	Cum	7,255.76	4282984.43

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Sl No	Description of Items	No	Length	Width	Depth	Quantity	Unit	Rate	Amount
11	Providing and laying in position reinforced **cement concrete of design mix M20** with OPC cement @ 320kgs, with 20mm and down size graded granite metal coarse aggregates @0.878cum and fine aggregtes @ 0.459cum, with superplastisiser @3lts confirming to IS9103-1999 Reaffirmed-2008, machine mixed, concrete laid in layers not exceeding 15 cms thick, vibrated for all works in foundation plinth and ground floor level for roof slabs, staircase, lintles, retaining walls, return walls, walls (any thickness) including attached plasters, columns, piers, abutments, pillars, posts, struts, buttresses, string or lacing courses, parapets, coping, bed blocks, anchor blocks, plain window cills, fillets etc., including cost of all materials, labour, HOM of machinery, curing, complete as per specifications.								
	For parapet wall	1	297	0.15	1.20	**53.46**	**Cum**	**6365.06**	**340276.11**
12	**Providing and removing centering, shuttering,** strutting, propping etc., for columns, pillars, piers, abutments, post and struts, square / rectangular / polygon in plan including cost of all materials, labour complete as per specificaiton.								
	For parapet wall	2	297.00		1.20	**712.80**	**Sqm**	**380.29**	**271070.71**
13	**Providing T.M.T. steel (Cold, Twisted) reinforcement** for R.C.C work including straightening, cutting, bending, hooking, placing in position, lapping and / or welding whereever required, lying with binding wire and anchoring to the adjoining members wherever necessary complete as per design (laps, hooks and wastage shall not be measured and Paid) cost of materials, labour, HOM of machinery complete as per specifications.								
	Item No-9	1	478.91						
	Item No-10	1	590.29						
	Item No-11	1	53.46						
			1122.7			**954.26**			
	Consider 86Kg/Cum	1				**833.13**	**Tn**	**8329.92**	**6939906.25**
	Up to 125%					**121.13**	**Tn**	**9003.60**	**1090615.07**
13.1	**Above 125%**								
14	**Filling available excavated earth** (excluding rock) in sides of foundations upto plinth in layers not exceeding 20 cms. in depth, compacting each deposited layer by ramming after watering with lead upto 50 m. and lift upto 1.5 m. including cost of all labour complete as per specifications.								
	Excavated Qty as per item No-6					**1782.00**			
	Deduct Qty of foundation								
	For Footing	1	297.00	3.40	0.30	302.94			
		0.50	297.00	1.10	0.30	49.01			
		0.50	297.00	1.75	0.30	77.96			
	Wall	1	297.00	0.47	0.90	125.63			
						555.54			
	Net Qty					**1226.46**	**Cum**	**114.58**	**140527.96**
15	**Disposal of excess earth** up to 20 kms lead (Loading and Unloading charges+Lead more than 4 km upto 5 km+Every km beyond 5 km upto 30 km)								
	Excavated Qty-Filling Qty								

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Sl No	Description of Items	No	Length	Width	Depth	Quantity	Unit	Rate	Amount
	Consider Item No-2					19699.00			
	Deduct Qty frm Item No 6-14					555.54			
	Deduct Qty frm Item No 6-5					13934.60			
						34189.14			
	Up to 125%					500.00	Cum	275.06	137530.00
15.1	Above 125%					33689.14	Cum	362.25	12203890.97
16	Towards PMC Cost								420000.00
17	Sub Total								35105069.98
18	Micelleaneous and Rounding off								87,105.02
	GRAND TOTAL								35192175.00

Assistant Engineer,

Asst. Executive Engineer,
BBMP,Bnagalore

Executive Engineer,
BBMP,Bnagalore

TECHNICAL SANCTION

Rs: 35,192,175/- (Rs Three crore fifty one lakhs ninety two thousand one hundred seventy five only) is accorded under the head:

P-2580

By CE(R.R.N.):

Registered as CE (R.R.N) No: 50-51 subject to conditions contained in enclosed memo No: 241 Date: 17/03/15

TA,

CE (R.R.N.)

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Name of work: Modified Estimate for Devlopment of water body at J.P Park in ward No-17

PWD SR-2014-2015& MI SR-14-15					Rate Analysis			
Sl No.	Description of Items	Unit	SR Page No	Item No	Basic Rate in Rs	AW 8%	Tender premium	Total Rate in Rs
1	KSRRB M2100-17.2. Plain / Reinforced Cement Concrete design mix M25 with OPC cement @ 340kgs, with 20mm and down size graded granite metal coarse aggregates @0.70cum and fine aggregates @ 0.47cum, with superplastisiser @3lts confirming to IS9103-1999 Reaffirmed-2008,Open Foundation complete as per Drawing and Technical Specification Case - II : With Batching Plant, Transit Mixer and Concrete Pump MORTH Specification No. 1500,1700 & 2100 (Pg 209 & Item no27.31)	Cum	209.0	27.31	5,226.00	418.08	846.61	6,490.69
2	KSRRB M2200-5.12.Plain / Reinforced Cement Concrete Design mix M25 with OPC cement @ 340kgs, with 20mm and down size graded granite metal coarse aggregates @0.7cum and fine aggregates @ 0.47cum, with superplastisiser @3lts confirming to IS9103-1999 Reaffirmed-2008 - i) Upto 5m height (Pg 213 & Item no 28.7.12)	Cum	213.0	28.7.12	5,842.00	467.36	946.40	7,255.76
3	Disposal of excess earth up to 20 kms lead (Loading and Unloading charges+Lead more than 4 km upto 5 km+Every km beyond 5 km upto 30 km)	Cum	21&22	5&6	315.00		47.25	362.25

Assistant Engineer,

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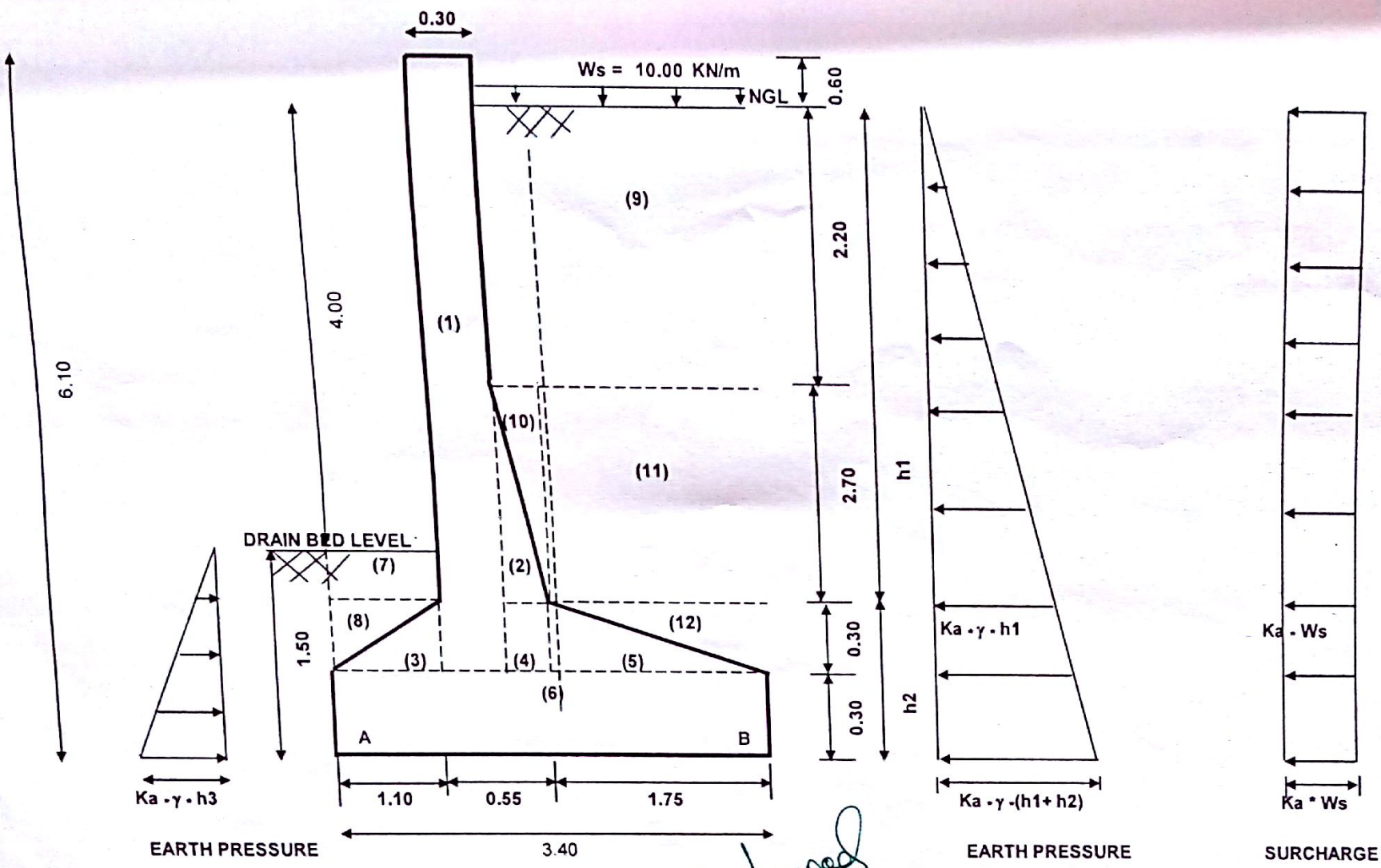
DESIGN OF CANTILEVER RETAINING WALL



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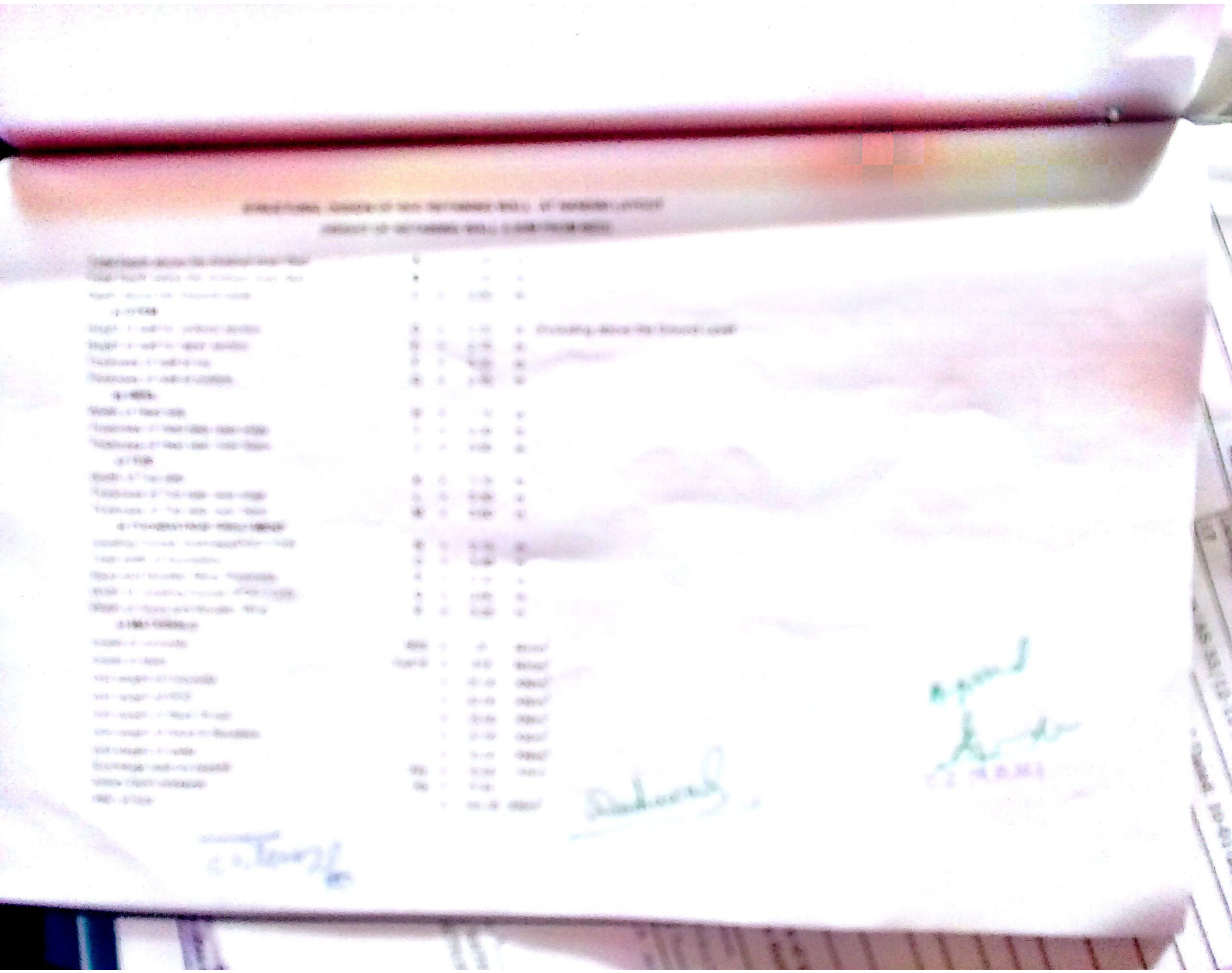

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STABILITY ANALYSIS AND PRESSURE CALCULATION

Comp. No.	Description	V (KN)	H (KN)	Lever arm (m)	MOMENT (KN-m)	
1	1 x 0.30 x 5.80 x 25	43.50		1.25	54.38	
2	0.5x 0.25 x 2.70 x 25	8.44		1.48	12.52	
3	0.5x 1.10 x 0.30 x 25	4.13		0.73	3.03	
4	1 x 0.25 x 0.30 x 25	1.88		1.53	2.86	
5	0.5x 1.75 x 0.30 x 25	6.56		2.23	14.66	
6	1 x 3.40 x 0.30 x 25	25.50		1.70	43.35	
7	1 x 1.10 x 0.90 x 18	17.82		0.55	9.80	
8	0.5x 1.10 x 0.30 x 18	2.97		0.37	1.09	
9	1 x 2.00 x 2.20 x 18	79.20		2.40	190.08	
10	0.5x 0.25 x 2.70 x 18	6.08		1.57	9.52	
11	1 x 1.75 x 2.70 x 18	85.05		2.53	214.75	
12	0.5x 1.75 x 0.30 x 18	4.73		2.82	13.31	
13	1 x 2.00 x 10	20.00		2.53	50.50	(Surcharge Weight)
14	Ka * Ws * h 0		18.15	2.75	-49.91	(Surcharge Pressure)
15	(1/2) * K_a * g * h^2		89.84	1.83	-164.71	(Earth Pressure Back fill Earth)
16	(1/2) * K_a * g * h^2		-6.68	0.50	3.34	(Earth Pressure Inside below bed)
	Total	305.84	101.31		408.55	

Total Moment (M) = 408.55 KN-m
Total Vertical Force (V) = 305.84 KN
Total Horizontal Force (H) = 101.31 KN

Therfore, $X = \frac{M}{V} = \frac{408.55}{305.84} = 1.336$ m

Eccentricity $e = \frac{B}{2} - X = \frac{3.400}{2} - 1.336$ m

$= 0.364$ m

$= 0.364$ m <B/6 HENCE O.K

Recommended

C.E (P.R.N.)

a) Soil Pressure

$$Pmax = \frac{V}{B}\left(1 + \frac{6*e}{B}\right)$$

$$= \frac{305.84}{3.400}\left(1 + \frac{6*0.364}{3.400}\right)$$

= 147.78 KN/m² LESS THAN SBC HENCE OK
SBC = 150.00 KN/m²

$$P_{min} = \frac{V}{B}\left(1 - \frac{6e}{B}\right)$$

$$= \frac{325.84}{3.430}\left(1 - \frac{6 * 0.364}{3.430}\right)$$

= 32.14 KN/m² MORE THAN ZERO HENCE OK

a) Check for Sliding

$$SI = \frac{\mu V}{H} =$$

μ = 0.60 (Frictional co-efficient Between Earth and Concrete)

$$\frac{0.60 \times 325.84}{121.31} = 1.611$$

MORE THAN 1.40 HENCE OK STABILITY

Q= σ_{bc}*k*j*(k/3)*2 KN-m Meq862

Where k = 33.33/(σst+33.33)
σ_{bc} = 8.33 N/mm2
σst = 166.75 N/mm2
k = 0.333
Q = 1.23
J = 0.889

i) DESIGN OF STEM

i) At Bottom

Maximum Bending Moment (M)

Bending Moment By Earth Pressure (M_1) = (1/6) * Ka * g * h^3 KN-m h = 4.80 m
= 116.47 KN-m

Bending Moment By Surcharge Earth Pressure (M_2) = (1/2) * Ka * Ws * h^2 KN-m
= 38.62 KN-m

Total Bending Moment (M = M_1+M_2) = 155.09 KN-m

Depth required = Sqrt(M/(Q*b)) = 355.82 mm D = 550 mm
d = 515 mm (0.35)

Area of steel required Ast = M / (σst*j*d) = 1825.7 mm²

Minimum % Area of Steel for 550 mm = 0.08
Min Ast = 440 mm²

Spacing Required for 20 mm dia = 172.08 mm
Provide 20 mm dia 125 C/C as Main Reinforcement

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Distribution Steel
Spacing Required for 10 mm dia = 178.52 mm
Provide **10** mm dia 150 C/C as Distribution Steel

Check for Shear Stress:
Shear Force = $(1/2 * Ka * g * h^2) + (Ka * Ws * h)$
= 87.48 KN
Shear Stress = 0.170 N/mm^2
Provided % Steel = 0.49
Permissible Shear Stress **0.306** N/mm^2 (Ref : IS456-2000, Page-84, Table-23)
Hence O.K

ii) At 1.350 m From bottom
Maximum Bending Moment (M)
Bending Moment By Earth Pressure (M1) = $(1/6) * Ka * g * h^3$ KN-m h = 3.55 m
= 44.29 KN-m
Bending Moment By Surcharge Earth Pressure (M2) = $(1/2) * Ka * Ws * h^2$ KN-m
= 20.79 KN-m
Total Bending Moment (M = M1+M2) = 65.09 KN-m
Depth required = Sqrt(M/(Q*b)) = **229.64** mm D = **425** mm
d = **390** mm (D-35)

Area of steel required $Ast = \frac{M}{\sigma st * J * d}$ = 1005.3 mm^2

Minimum % Area of Steel for 425 mm = **0.08**
Min.Ast = **352** mm^2

Spacing Required for 20 mm dia = **312.54 mm**
Provide **20** mm dia 250 C/C as Main Reinforcement
Distribution Steel
Spacing Required for 10 mm dia = **223.06 mm**
Provide **10** mm dia 150 C/C as Distribution Steel

Check for Shear Stress:
Shear Force = $(1/2 * Ka * g * h^2) + (Ka * Ws * h)$
= 49.14 KN
Shear Stress = 0.126 N/mm^2
Provided % Steel = 0.32

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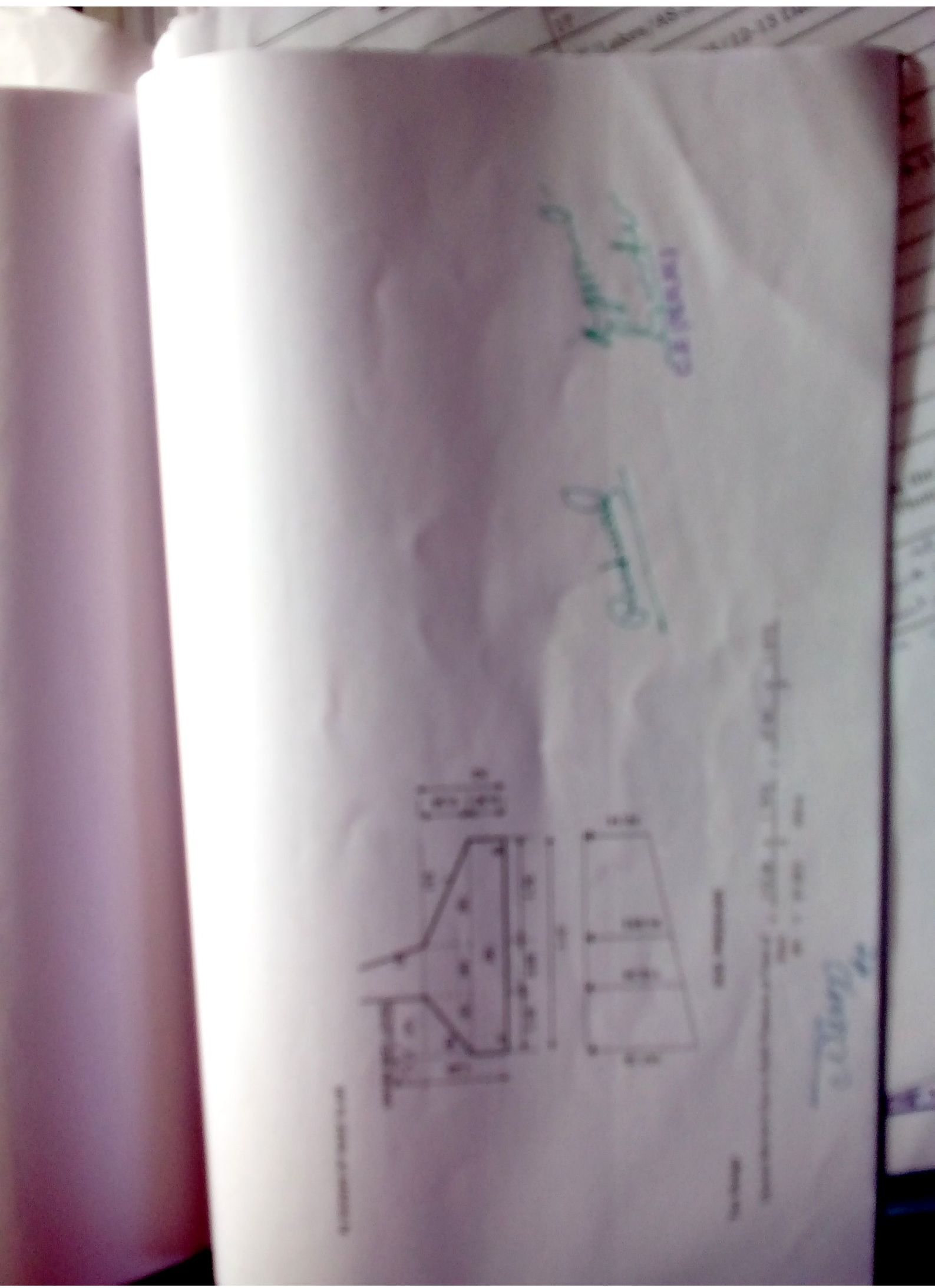

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Downword Moment Due to Self Weight of slab = $\frac{7.50 \times 1.10^2}{2} + \frac{8.25 \times 1.10}{3}$ (Neglect Weight of earth above slab)

M2 = 7.56 KN-m

Net Moment (M = M1-M2) **M = 74.29** KN-m

Shear Force **V = 141.97 - 11.25** (Neglect Weight of earth above slab)

= **130.72** KN

Depth required = Sqrt(M/(Q*b)) = **245.34** mm D = **600** mm

d = **565** mm (D-35)

Area of steel required $Ast = \frac{M}{\sigma st * J * d}$ = 792.06 mm^2

Minimum % Area of Steel for 600 mm = **0.08**

Min.Ast = **480** mm^2

Spacing Required for 16 mm dia = **253.88 mm**

Provide **16** mm dia 200 C/C as Main Reinforcement

Distribution Steel

Spacing Required for 12 mm dia = **235.65 mm**

Provide **12** mm dia 200 C/C as Distribution Steel

Check for Shear Stress:

Shear Force = 130.72 KN

Shear Stress = 0.231 N/mm^2

Provided % Steel = 0.178

Permissible Shear Stress **0.201** N/mm^2 (Ref : IS456-2000, Page-84, Table-23)

Design for Shear reinforcement

Heel Design

Upword Moment Due to Earth Pressure at Face of Stem = $\frac{32.14 \times 1.75^2}{2} + \frac{59.51 \times 1.75^2}{3}$ -

M1 = 109.97 KN-m

Downword Moment Due to Self Weight of slab = $\frac{7.50 \times 1.75^2}{2} + \frac{13.13 \times 1.75}{3}$

M2 = 19.14 KN-m

Downword Moment Due over burden soil = $\frac{88.20 \times 1.75^2}{2} + \frac{9.45 \times 1.75 \times 2}{3}$

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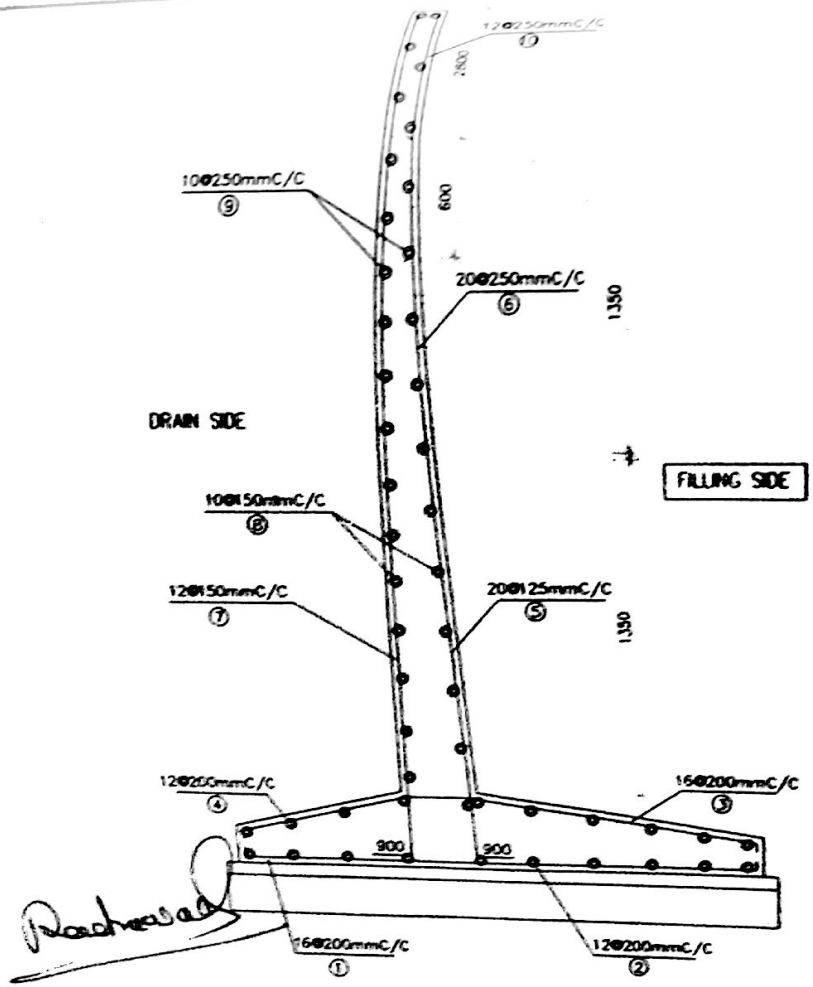

SECTION OF RETAINING WALL

①	ϕ 16		200 c/c
②	ϕ 12	——	200 c/c
③	ϕ 16		125 c/c
④	ϕ 12	——	200 c/c
⑤	ϕ 20		125 c/c
⑥	ϕ 20		200 c/c
⑦	ϕ 12		150 c/c
⑧	ϕ 10	——	150 c/c
⑨	ϕ 10	——	250 c/c
⑩	ϕ 12		250 c/c

C.E (R.R.N.)